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(54) Device for weighing mail while the mail is in motion

(57) Device for weighing mail while it is in motion, in particular letters oriented standing on edge.

The object is to improve functional characteristics and to expand the range of applications.

Based on this object, the invention must be able to weigh letters standing on edge and moving at a high transport velocity with a high degree of accuracy and over a wide weight range.

Elements of the invention:

- a flexurally and torsionally rigid weighing plate 6 of light-weight design is provided for the letters A, coupled to a weighing cell at approximately the location of the common center of gravity S of the weighing plate 6 and a letter A having the maximum permissible weight and the maximum permissible dimensions located on the weighing cell 7,
- the weighing plate 6 has a rear wall 61 for guiding the letter A and a conveyor device 4 that possesses a conveyor belt 41 and that also forms the base of the weighing plate 6.

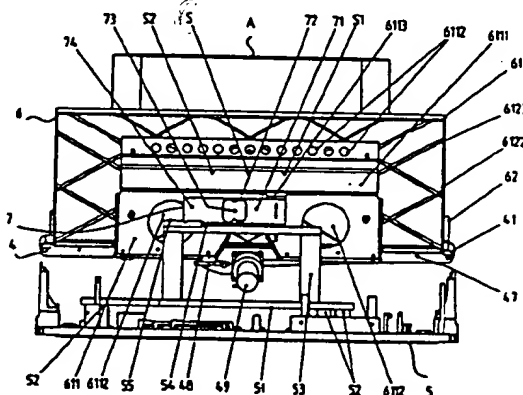


Fig. 4

The connection between the weighing plate 6 and the weighing cell 7 recited in the invention minimizes the undesirable effects of the load arm. The design of the weighing plate 6 as recited in the invention reduces its dimensions substantially and substantially increases its rigidity, which results in short stabilization times for the entire measuring system, which consequently permits correspondingly fast letter transport speeds.

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**Pat nt Claims**

1. Apparatus for weighing pieces of mail in motion, in particular letters oriented standing on edge,  
characterized by the following features:

- a weighing plate (6) of light-weight and flexurally and torsionally rigid design is provided for the mail (A) and is connected to a weighing cell (7) at the approximate location of the common center of gravity (S) of the weighing plate (6) and a piece of mail (A) located in a position centered on the weighing plate (6) and having the highest permitted weight and the maximum permitted dimensions,
  - the weighing plate (6) has a rear wall (61) for guiding the mail (A) and a conveyor device (4) for transporting the mail that also forms the base of the weighing plate (6).
2. The apparatus of Claim 1, wherein
- the approach to the weighing plate (6) is designed such that the mail (A) by and large tangentially contacts the conveyor device (4) as well as the rear wall (61) and the exit area downstream from the weighing plate (6) is recessed laterally and in a downward direction so that the mail (A) initially is suspended in mid-air as it leaves the weighing plate (6) in the discharge area.
3. The apparatus of Claim 1, wherein
- the conveyor device (4) has a conveyor belt (41) that forms the base of the weighing plate (6).
4. The apparatus of Claim 1, wherein
- the rear wall (61) is comprised of a guide plate (612) for the mail (A) and a carrier plate (611) connected to said guide plate on the rear side,  
the guide plate (612) is designed in a box-like shape, with the front side smooth and having horizontal slide ribs (6121) for the mail (A) and on the rear side having a circumferential collar (6122) with reinforcing members (6123) extending diagonally to one another,  
the carrier plate (611) is provided with holes (6112) in areas subject to low mechanical loads, and has a shoulder (6111) that is stamped so that it faces the outward direction and that is connected to the free end (71) of the weighing cell (7) by means of a flat interposed tee (6113) so that the common center of gravity (S) is slightly above the sensitive area (72) of the weighing cell (7), and the sensitive area (72) is affected by the load at the most highly affected area of the weighing cell (7).
5. The apparatus of Claim 4, wherein
- the guide plate (612) is comprised of a material having a low specific gravity and high strength.
6. The apparatus of Claim 5, wherein
- the guide plate (612) is comprised of acrylonitrile-butadiene-styrene or a carbon fiber-reinforced plastic.
7. The apparatus of Claim 4, wherein
- the load plate (611) and the tee (6113) are made of extra hard duraluminum.
8. The apparatus of Claim 1, wherein
- the rear wall (61) has a ribbed design and is located behind a rear wall (1) of the scale and is provided with slide ribs (6121) for the mail (A), said ribs extending through matching horizontal, narrow slit-like openings (11).
9. The apparatus of Claim 9, wherein
- the rear wall (61) is functionally comprised of a guide unit (612) for the mail (A) and a carrying unit (611) connected to said guide unit on the rear side, the guide unit (612) being formed by the slide ribs (6121) arranged parallel and equidistant from one another.
10. The apparatus of Claims 8 to 9, wherein
- the holes (11) are larger in height than the total dimension arrived at by adding the thickness of the slide ribs (6121) to the maximum stroke of the weighing plate (6), the load-carrying unit (611) comprises two tee-shaped members (6114) and a plate (6115) which is located between said members and which connects said members to one another, having a shoulder (6111) connected to a weighing cell (7) in such a way that the common center of gravity (S) lies slightly above the

sensitive area of the weighing cell (7), and the sensitive area is the area of the weighing cell (7) that is most strongly affected by the load.

**11. The apparatus of Claims 9 and 10, wherein**

the slide ribs (6121) are disposed on the cross-members of the tee members (6114) oriented orthogonally relative to said cross-members.

**12. The apparatus of Claim 1, wherein**

the rear wall (61) is a single piece of a sandwich construction having at least one central force application element with which the rear wall is connected to the free end (71) of the weighing cell (7) in such a way that the common center of gravity (S) lies slightly above the sensitive area (72) of the weighing cell (7).

**13. The apparatus of Claim 12, wherein**

the rear wall (61) consists of a closed-cell, rigid, integral-skin polystyrene foam and a force-applying element of an especially hard duraluminum.

**14. The apparatus of Claims 1 to 2, wherein**

the weighing plate (6) is U-shaped when viewed in the cross section, with the conveying device (4) comprising the base of the weighing plate, with the front wall (62) of the weighing plate being lower relative to the parallel load-bearing rear wall (61) but being high enough so that the envelope flap of an open piece of mail (A) touches the front wall (62) only, the front wall (62) is bent slightly forward in the approach area, the rear wall (61) is inclined from the vertical slightly to the rear, and the conveyor belt (41) is disposed orthogonally relative to the rear wall (61).

**15. The apparatus of Claim 14, wherein**

the rear wall (61) is inclined 18°.

**16. The apparatus of Claims 1 to 2 and 14, wherein**

in addition to having a conveyor belt (41), the conveyor device (4) has a support plate (46) for the portion of the belt bearing the load generated by the mail, as well as a front and a rear idler roller (42, 43), a tensioning roller (45) and drive roller (44) located roughly in the center, as well as a motor (49) coupled kinematically to said drive roller (44), the tensioning roller (45) can, by means of a clamping device (48), be adjusted and restrained in opposition to the direction in which the mail is being transported, and all the rollers (42, 43, 44, 45) in the conveyor device (4) are held between two longitudinal carrier plates (47), whereby the front wall (62) of the weighing plate (6) is attached to the front carrier plate (47) and the support plate (46) is attached to the rear carrier plate (7[sic]), and the conveyor device (4) having the rear carrier plate (47) is attached to the rear wall (61) of the weighing plate (6) in such a way that the motor (49) and the drive roller (44) are disposed just below the common center of gravity (S).

**17. The apparatus of Claims 1 and 16, wherein**

a front cover plate (2) is provided at a close distance to and parallel to the front wall (62) of the weighing plate (6) and said cover plate (2) extends over the full length of the scale and is at least as high as the rear wall (61) of the weighing plate (6).